REMARKS

Claims 6-8, 10-17, 19, 30, and 33-39 are now pending in the application. Claim 30 is amended to correct its dependency. New claims 35-39 have been added; these claims are supported throughout the original specification, for example by page 6, lines 1-2; page 8, lines 1-6 & 15-26; page 9, lines 18-23; page 11, lines 8-19; page 12, lines 16-18; and the original claims.

The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

CLAIM OBJECTION

Claim 31 was objected to for being dependent on cancelled claim 1. Applicants believe the objection was intended to have been made against claim 30. The dependency of claim 30 has been corrected.

RESTRICTION REQUIREMENT

Restriction has been required between the invention of Group I, claims 6-8, 10-17, 19, 30, 33, and 34 and the invention of Group II, claims 20-29, 31, and 32. In a telephone conversation with the examiner, Applicant provisionally elected to prosecute Group 1, claims 6-8, 10-17, 19, 30 and 33-34 without traverse. Applicant affirms the election of the invention of Group I, claims 6-8, 10-17, 19, 30 and 33-34 without traverse. Claims 20-29, 31 and 32 were withdrawn in the Office Action and have been cancelled.

REJECTIONS UNDER 35 U.S.C. § 103

Claims 6, 10-12, 15-17, 19, 30, 33 and 34 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nielsen (WO Pat. No. 92/08783) in view of Michaels (WO Pat. No. 93/22036). This rejection is respectfully traversed.

The Nielsen and Michaels references teach alternative methods for reducing alcohol content of wine or beer that provide no reason for combination at all, let alone any direction for modifying the primary Nielsen reference in such a way as to provide all of the features of Applicant's claims.

The Nielsen reference discloses a process for reducing the alcohol content of naturally fermented beverages using reverse osmosis (RO). Its various embodiments include optional pre-filtration treatments of the feed stream to improve the performance of the reverse osmosis stage and prevent desirable beverage components from being removed with the alcohol in the reverse osmosis step. These pre-treatments are described as, first, a micro-filtration (MF) to reduce the colloidal content of the feed stream to the next stage; second, a nanofiltration (NF) step to reduce the aroma and flavor content of the feed stream to the reverse osmosis (RO) step. The embodiments shown in Figures 1-3 show different combinations of these processes. The first figure shows all three steps - MF, NF, RO. The second shows NF and RO and the third shows MF and RO. The actual alcohol separation and, supposedly reduction, takes place at this final (RO) stage.

Importantly, the Nielsen reference teaches that the permeate from its reverse osmosis step is discarded and water is added to replace the volume of permeate

removed. Page 12, lines 26-29. In this way, the Nielsen process is like that described in Applicant's specification on page 3, lines 11-17, and it presents the same difficulties.

It is also true that the Nielsen reference in places is jumbled and unclear. Beginning at line 14 on page 21, and on page 8, lines 11 to 23, the Nielsen reference appears to say that the reverse osmosis membranes are selectively permeable to ethanol so that ethanol passes into the permeate but aroma and flavor are retained in the retentate. But it is also true that these membranes are even more permeable to water so the permeate will always be lower in alcohol concentration than the retentate, as the osmosis is controlled by molecular size and the water molecule is both smaller than ethanol and more abundant in the stream contacting the membrane. The present inventor's experience is that reverse osmosis membranes with such permeability characteristics for wine in every case result in the concentration of ethanol with regard to water in the permeate always less than in the retentate. Nielsen, however, seems to state the opposite: "In general, the separation results in a stream of retentate which has a higher concentration of flavor and aroma compounds which pass through the previous processing steps than in the feed. Such a retentate has a lower ethanol content than the feed. The permeate is primarily water and ethanol wherein the ethanol concentration is higher than the feed, with little if any, aroma and flavor containing compounds." Page 22, lines 24-33. For whatever reason, the Nielsen reference appears to be less than dependable.

To achieve a reduced alcohol concentration in the beverage, it is necessary to separate ethanol from water at some point, and the Nielsen reference really achieves this by adding new water to replace the volume of permeate removed. With water

addition the alcohol concentrate of the beverage will indeed fall, but this is because of dilution by water addition then concentration by RO to remove the same volume of liquid. In effect the ethanol is washed out in the permeate of the reverse osmosis step while flavor and aromas are retained. In this regard the process is conceptually very similar to the patent of Gnekow, US 4,888,189, which involves the addition of water to the wine feed of a reverse osmosis plant to produce low or no alcohol wines. Both of these approaches are inappropriate to the dealcoholisation of standard wines because they involve the addition of water directly to the wine stream. While permitted in the production of many other beverages, water addition to wine is not allowed in most wine producing countries. The practical consequences of this point are very important indeed. What it would mean in practice is that in most wine producing countries of the world, the process of Nielsen would not be permitted to be used for reduction of alcohol in wine. This invention seems rather intended for beer production where water addition is naturally a part of the process. See, e.g., page 25, lines 21-22 ("The preferred feed to the process and apparatus of this invention is beer."). Thus, it does not seem very compatible with the different requirements for wine.

It is important to note that this process as described in Nielsen does not involve any treatment and recombination of reverse osmosis permeate with the reverse osmosis retentate, which is part of the process of claim 6. In the Nielsen process, the apparent recombination step is for the retentate of the micro- and nanofiltration pre-treatment stage at which no alcohol adjustment takes place. Indeed, in Nielsen as the preliminary nanofiltration stage is optional, if it is removed and only microfiltration is incorporated, then there would be no means to preserve the valuable flavors and

aromas which might be damaged or lost in the alcohol reduction stage. This suggests that Nielsen did not see the essential need for nanofiltration which, as an optional alternative to reverse osmosis, is a fundamental first step in the Applicant's process.

The Michaels document discloses a generic process using hydrophobic microporous membranes to selectively remove volatile components from liquid mixtures. The main application described is the removal of alcohol from a mixture. Michaels therefore merely proposes the use of the principle of evaporative perstraction and contactors. However, in Michaels the use is based on direct contact of wine with the extracting liquid. In this system, the passage of volatile components other than alcohol is controlled by manipulating their concentration in the strip liquid. This is difficult to do correctly and virtually forces the use of a "model" wine without alcohol as the strip which makes the process technically difficult to control and therefore more expensive.

In fact, Michaels discloses (pp. 8-9) that not only does alcohol pass across the membrane but water as well, in this case from the strip into the wine. In winemaking this is unacceptable and Michaels proposes adding sodium chloride to the strip to prevent this tendency. In the Applicant's invention this is unnecessary because the reverse osmosis or nanofiltration step, has the effect of reducing the osmotic pressure of the permeate.

There is no reason to modify the Nielsen process by omitting the required C step, which must be included in each of Nielsen's disclosed processes. The rejection hinges on this replacement, but the replacement can only be seen as an exercise of hindsight analysis as that step is key to the Nielsen process.

Even if there were a reason to make the substitution, it would still not result in the claimed invention. First, the processes proposed by Nielsen involve an optional nanofiltration unit 23 and reverse osmosis unit 34. It is submitted that a person skilled in the art would have no motivation or guidance as to where the contactor of Michaels should be substituted in Nielsen, that is to say: should it replace the nanofiltration unit 23 or the reverse osmosis unit 34? It is submitted that only with hindsight would the person skilled in the art select the reverse osmosis unit 34 for substitution by the contactor.

Second, and more importantly, even if the substitution of a contactor were made for the reverse osmosis unit 34, it would not result in a workable process. It needs to be borne in mind that in all of the embodiments of Nielsen, make-up water from the tank 42 needs to be supplied to the holding vessel 29 which supplies the feed to the reverse osmosis unit in order for alcohol reduction to take place. If a contactor such as disclosed in Michaels is simply substituted into Nielsen for reverse osmosis membrane module 34, it is not apparent where the strip water would be supplied. It is submitted that a person of ordinary skill in the art would not simply substitute a contactor in the process of Nielsen because there would be no technical solution as to where the strip water should be supplied. It is submitted, therefore, that the requirement in all of the embodiments of Nielsen for make-up water from the tank 42 teach away from the invention. In fact if water were supplied to holding vessel 29, this would work against the efficiency of the Michaels process and by adding water directly to the product, would be unacceptable for wine production. Further, if the partially dealcoholised output of the Michaels contactor were recycled via conduit 37, valve 28 and conduit 30, this would

also diminish process performance. A person of ordinary skill in the art would therefore have no motivation at all to attempt to substitute a contactor of Michaels into the processes of Nielsen.

Also, the reverse osmosis pump 36 of Nielsen would need to be a high pressure pump which would be required for the reverse osmosis unit 34. It is believed that a high pressure pump would be quite inappropriate for use with a contactor.

For these reasons, independent claim 6 and each of its dependent claims are patentable over the combination of the Nielsen and Michaels references.

Claims 7 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nielsen (WO Pat. No. 92/08783) in view of Michaels (WO Pat. No. 93/22036) as applied to Claim 6 above and in further view of Zhang et al. (U.S. Pat. No. 6,586,638). This rejection is respectfully traversed.

These claims include a feature of heating of the strip solution and/or raw permeate prior to contacting the strip solution with the membrane. Because of the elevated temperature, the efficiency of alcohol removal from the retentate is substantially increased. Heating of the wine in Michaels, however, would be impossible because Michaels direct treats the wine in the contactor and the wine would be seriously damaged by the heat. There would also be considerable loss of volatiles from the wine at these higher temperatures. In Applicant's processes in claims 7 and 8, the elevated temperature is on the permeate only and not on the wine and therefore it is possible to work with these elevated temperatures and achieve high efficiencies.

Zhang US 6,586,638 may suggest that heating the treated fluid and/or stripping solution will increase the mass transfer rate across the membrane, but the Zhang membrane is a non-porous membrane. It does not necessarily follow and is not obvious that the same result would occur for hydrophobic microporous membranes used by the Applicant. In the former case there is a diffusion of the phenolics across a solid membrane. In the latter the process involves the evaporation of alcohol vapor at one surface into a gas phase and its subsequent condensation and dissolution into the liquid phase on the other side of the microporous membrane.

Zhang does nothing more than show the step of heating liquids to facilitate the mass transfer of phenolic compounds "across a non porous, selectively permeable membrane" Col. 1, para. 1. In fact, Zhang specifically teaches against the use of microporous hydrophobic membranes as used in the Applicant's invention and proposes heating as one of a number of approaches to overcome the limitations of these microporous membranes for the nominated process in column 1. The field of technology is quite unrelated to treatment of wine and it is submitted that even if it were permissible to combine Nielsen and Michaels, there would be no motivation for a person skilled in the art to combine the teachings of Zhang because they relate to a completely different field of technology.

For these reasons, claim 7 and 8 are patentable over the combination of the Nielsen and Michaels references taken with Zhang.

Claims 13 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable Nielsen (WO Pat. No. 92/08783) in view of Michaels (WO Pat. No. 93/22036) as applied to Claim 6 above and in further view of Zhang et al. (U.S. Pat. No. 6,586,638) in view of Tonelli et al. (U.S. Pat. No. 5,998,745). This rejection is respectfully traversed.

Even if it were permissible to combine Nielsen and Michaels, there would be no motivation for a person skilled in the art to utilize the degassing step of Tonelli US 5,997,745 because Tonelli is again concerned with a completely different field of technology. Tonelli removes CO_2 in order to make ultra pure water. This is a completely different application where even small amounts of CO_2 will affect conductivity and pH of the treated water. In the Applicant's process the main concern is excess oxygen in the strip water. If not reduced, this would pass into the dealcoholised permeate and then the wine where it would degrade desirable wine components. The Applicant has no concern for the pH effect which, unlike ultra pure water, would be negligible in a highly buffered system like wine. The main reason for removing CO_2 as well is that its bulk flow through the microporous membrane could interfere with the passage of alcohol.

Thus, claims 13 and 14 are patentable over Nielsen and Michaels references in view of both the Zhang and Tonelli references.

EVIDENCE OF SECONDARY CONSIDERATIONS

Submitted with this Amendment is a document demonstrating that the claimed invention has been acclaimed in the wine industry as the first practical method of reducing the alcohol content of wine without using any form of distillation or water addition nor adversely affecting the flavors of the wine. In this respect I am attaching a

copy of an article entitled *Memstar Wows Judges with Competition Triumph*, p60-61, The Australian & New Zealand Grapegrower & Winemaker, July 2007. This article refers to the success of the applicant's invention.

CONCLUSION

Prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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